

What Is Claimed Is:

1. A permanent magnet type rotating electrical machine comprising;
  - 5 a stator provided with armature wiring in multiple slots on a stator core,
    - 10 a first rotor core split into multiple parts in the axial direction and containing permanent magnets built in multiple permanent magnet insertion holes, and
    - 15 a second rotor core for producing reluctance torque;
  - 15 said permanent magnet type rotating electrical machine characterized in that said first rotor core is arranged so that the gap length of the magnetic path on the q-axis side is greater than that on the d-axis side.
2. A permanent magnet type rotating electrical machine comprising;
  - 20 a stator provided with armature wiring in multiple slots on a stator core,
    - 25 a first rotor core split into multiple parts in the axial direction and containing permanent magnets built in multiple permanent magnet insertion holes,

and

a second rotor core for producing reluctance torque;

5        said permanent magnet type rotating electrical machine characterized in that a concave portion is provided between poles in the vicinity of the outer surface on said first rotor core, and a flux barrier having almost the same form as that of said permanent magnet insertion hole is formed on said second rotor  
10      core in the cross section in the radial direction.

3.      A permanent magnet type rotating electrical machine comprising;

15      a stator provided with armature wiring in multiple slots on a stator core,

a first rotor core split into multiple parts in the axial direction and containing permanent magnets built in multiple permanent magnet insertion holes, and

20      a second rotor core for producing reluctance torque;

25      said permanent magnet type rotating electrical machine characterized in that a concave portion is provided between poles in the vicinity of the outer surface on said first rotor core, and

a flux barrier having almost the same form as that of said permanent magnet insertion hole, and an almost true round peripheral shape are formed on said second rotor core in the cross section in the 5 radial direction.

4. A permanent magnet type rotating electrical machine comprising;

10 a stator provided with armature wiring in multiple slots on a stator core,

a first rotor core split into multiple parts in the axial direction and containing permanent magnets built in multiple permanent magnet insertion holes, and

15 a second rotor core for producing reluctance torque;

said permanent magnet type rotating electrical machine characterized in that a concave portion is provided between poles in the vicinity of the outer 20 surface on said first rotor core, and

said second rotor core has a hole having almost the same form as that of said permanent magnet insertion hole wherein said hole is devoid of permanent magnet, and

25 an almost true round peripheral shape in the cross

section in the radial direction.

5. A permanent magnet type rotating electrical  
machine according to any one of Claims 1 to 4  
5 characterized in that

the width of said permanent magnet insertion hole  
on said first rotor core is designed greater than that  
of said flux barrier or said hole provided on said  
second rotor core.

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6. A permanent magnet type rotating electrical  
machine comprising;

a stator provided with armature wiring in multiple  
slots on a stator core, and

15 a first rotor core containing permanent magnets  
built in multiple permanent magnet insertion holes  
formed on the rotor core;

wherein said rotor further comprising;

a first rotor core further provided with

20 a permanent magnet insertion hole incorporating a  
permanent magnet and

a concave portion between the poles in the  
vicinity of the outer surface; and

25 a second rotor core split from said first rotor  
core in the axial direction and forming the same form

as that of said permanent magnet in the cross section in the radial direction.

7. A permanent magnet type rotating electrical  
5 machine comprising;

a stator provided with armature wiring in multiple slots on a stator core, and

a first rotor core containing permanent magnets built in multiple permanent magnet insertion holes  
10 formed on the rotor core;

wherein said rotor further comprising;

a first rotor core further provided with a permanent magnet insertion hole incorporating a permanent magnet and

15 a concave portion between the poles in the vicinity of the outer surface; and

a second rotor core split from said first rotor core in the axial direction, forming the same form as that of said permanent magnet in the cross section in the  
20 radial direction, and having almost true round peripheral shape.

8. A permanent magnet type rotating electrical machine according to any one of Claims 1 to 7  
25 characterized in that

arrangement of said permanent magnet insertion hole provided on said first rotor core is different from that of said flux barrier or said hole provided on said second rotor core.

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9. A permanent magnet type rotating electrical machine according to any one of Claims 1 to 8 characterized in that

10 the number of flux barriers or holes provided on said second rotor core is greater than that of said permanent magnet insertion holes provided on said first rotor core.

15 10. A permanent magnet type rotating electrical machine according to any one of Claims 1 to 8 characterized in that

20 said permanent magnet insertion holes provided on said first rotor core and the flux barriers or holes provided on said second rotor core are formed in a straight line or shaped like a letter U or V.

11. A permanent magnet type rotating electrical machine according to any one of Claims 1 to 10 characterized in that

25 said permanent magnet insertion holes provided on

50  
said first rotor core and the flux barriers or holes provided on said second rotor core are formed like a letter duplicate U or V.

5 12. A permanent magnet type rotating electrical machine according to any one of Claims 1 to 11 characterized in that

non-magnetic substances are inserted in the flux barriers or holes provided on said second rotor core.

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13. A permanent magnet type rotating electrical machine according to any one of Claims 1 to 12 characterized in that

15 said permanent magnet rotating electrical machine is driven by a 180-degree current-applied sinusoidal wave inverter without magnetic pole position sensor.

20 14. A compressor arranged to be driven by a permanent magnet type rotating electrical machine according to any one of Claims 1 to 13.

15. An air conditioner comprising a compressor according to any one of Claims 1 to 14.